Leveraging Existing Capital Assets
MULTIPLE HEARTH FURNACES

Why are MHF’s Worth Keeping?

- Existing MHF’s represent a valuable capital asset
- Upgrading MHF’s costs a lot less than a new incinerator
- Operating costs of incineration is usually lower than other options such as hauling or dryers
- Compliance with the new regulations is achievable
MULTIPLE HEARTH FURNACES

For example,

- It would cost up to $6M MAXIMUM to bring this plant’s existing 2 MHFs back online within 1 year or less.

- That is a cost saving of at least $22M and 6 years ahead of the current estimated scheduled completion date.
2011 - Section 129 of the Clean Air Act

That same year, court case forces EPA to regulate SSI’s as “Solid Waste Incineration Units”

EPA publishes new regulations
Part 60 - LLLL for New SSI’s
Part 60 - MMMM for Existing SSI’s

Panic Ensued
MULTIPLE HEARTH FURNACES
Intent of the Clean Air Act

Section 129 requirements
• Technology-based emission standards
• Emission levels that are achievable for new and existing units
• Cost, energy requirements, and other impact considerations

What was the outcome?
• EPA initially proposed some relatively tight emission limits
• After a long period of questions and comments, the final emission levels were attainable
• Existing MHF’s were given very reasonable emissions goals

THE INTENT BEHIND THE IMPOSED EPA REGULATIONS WAS TO ALLOW EXISTING MHF’s TO CONTINUE OPERATION
MULTIPLE HEARTH FURNACES

What’s missing?
Our Design for EPA Compliance & Proven Performance

The Hartford Solution – One MHF Operation

- Conversion to “Zero Hearth” Afterburner
- Multi-venturi Scrubber
- Low-NOX “MHF” Burner System
- Upgraded Controls System
- New I.D. Fans with VFD’s
The Hartford Solution – One MHF Operation

Results

• Full regulation compliance was achieved, including new Quad-M Regs
• All visible emission were eliminated
• Simplified operations
• Reduced costs
• Increased capacity
Proven Performance at Atlanta
Georgia’s R.M. Clayton WRC

BEFORE (at 0.7 Dry Tons/Hr)

AFTER (at 2.4 Dry Tons/Hr)
Proven Performance at Atlanta Georgia’s R.M. Clayton WRC

- 1st Upgrade dictated by regulatory pressure
- After results were similar to those in Hartford
- 2nd Upgrade ordered for the other furnace
- Capital-intensive equipment plans were dropped
- MHF’s became the disposal method of choice

BEFORE (at 0.7 Dry Tons/Hr)  AFTER (at 2.4 Dry Tons/Hr)
MULTIPLE HEARTH FURNACES

How do we make this possible?
• Sludge injection into 3rd hearth – Choke-fed screw conveyors shown
• Injection can be by sludge pumps (best method)
• Injection can be directly by drop chutes (not recommended)
• Dropholes in Hearth #2 strategically blocked depending on breech location
• Burners may be added to Hearths #2 or #3, if required
• Initial Quench Section cools exhaust gases
• Followed by Tray Scrubber
• Mist Eliminator collects remaining particulates
• Sub cooling makes metals removal more efficient
• Scrubbing stages are in logical sequence
• Energy levels are lower due to Venturi design
MULTIPLE HEARTH FURNACES

MHF Burners

Low NOx - High Velocity
• Primary Function – Emissions Reduction in NOx, CO, and THC
• Diluted furnace atmosphere lowers NOx – Lower $O_2$ level; Lower flame temps
• More turbulence = More efficient combustion = Lower CO & THC
• Furnace operation is more stable and more easily controlled
• Lower and more even temperatures reduces or even eliminates slag
• More efficient burning usually results in increased production
• Design is specifically for the MHF – Greatly reduced maintenance
MHF Control System
Advance Process Control

• New Controls are needed as part of the new emissions control system

• Intelligent Motor Control Center (IMC) integrates motors and VFD’s
  o Drop-in-place system simplifies field installation and startup, cuts costs
  o All motor variables become accessible to the control system
  o Alerts Maintenance with predictive failures

• Advanced Process Control (APC) can integrate all solids handling equipment
  o Includes smart instruments, plus sludge cake solids meter (New)
  o Anticipates changes from dewatering, applies Feed-Forward responses
  o Multi-variable loop control – utilizes all disturbance variables
MHF Control System
Advance Process Control

• Simple implementation of EPA monitoring and reporting requirements
• Performs all CEMS functions (no new CEMS for Carbon Monoxide)
• Safer, improved operations, reduced maintenance, and saves money

For more specific information, please contact:

Mike Hilton, Director of IFCO Engineering
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<th>Cadmium mg/dscm</th>
<th>CC/CF, TEQ mg/dscm</th>
<th>CO ppmv</th>
<th>HCL ppmv</th>
<th>Mercury Mg/dscm</th>
<th>NOx ppmv</th>
<th>Lead mg/dscm</th>
<th>Particulate mg/dscm</th>
<th>SO2 ppmv</th>
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<td>4.3 %</td>
<td>22.8 %</td>
<td>19.7%</td>
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MULTIPLE HEARTH FURNACES
Leveraging Existing Capital Assets, MHF

- Full compliance with all regulations
- Capacity increased
- Turn down flexibility
- Remote off-shift hot standby operations

Cost between $4 - $6 Million